Nanocasting of 3D Porous Materials by Melt Infiltration

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Nanocasting of 3D Porous Materials by Melt Infiltration

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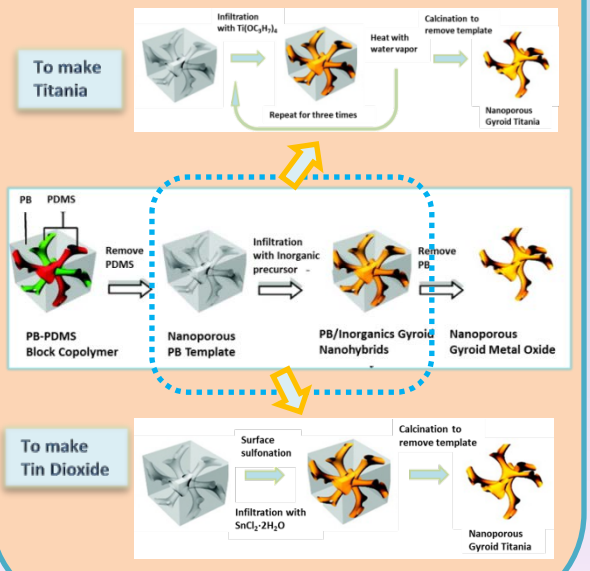
OBJECTIVES

Fabrication of an interconnected, crack-free and highly ordered metal oxides film, such as Titania and Tin Dioxide by using nano-porous polymer of controlled morphology as the template.

ABSTRACT

- Nano-porous cross-linked polybutadiene has been used as the template which has good wetting properties with various inorganic precursors.
- A novel and facile nanocasting process has been developed to fabricate of a thin film with 10-nm wide titania and Tin Dioxide network which is compact, inter-connected, and continuous.

STRATEGY



RESULTS

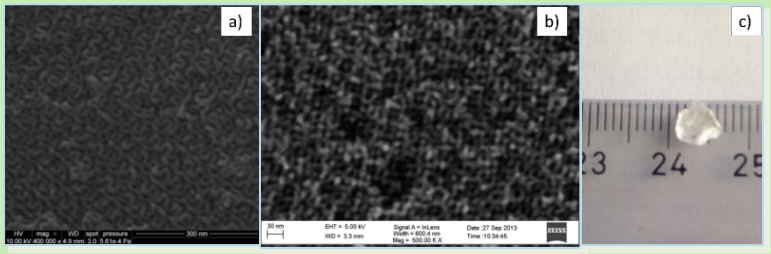


Figure. 1. a) SEM picture of the nano-porous polybutadiene template. **b)** SEM picture of the as-made titania network with a crystal phase of anatase. c) As-made titania thin film

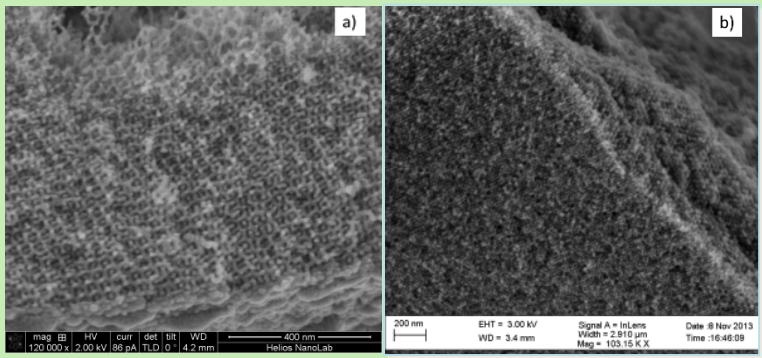


Figure. 2. a) Incomplete filling of tin dioxide with skin layer, **b)** With surface modification and rinsing, it shows complete filling of tin dioxide without any skin layer.

FUTURE WORK

For various applications, it is more desirable to cast the nano-structure directly on certain substrate.

The figure on the right shows the polymer template on top of the Pyrex glass, and this will be used to make metal oxides gyroid structure by the same straegy.